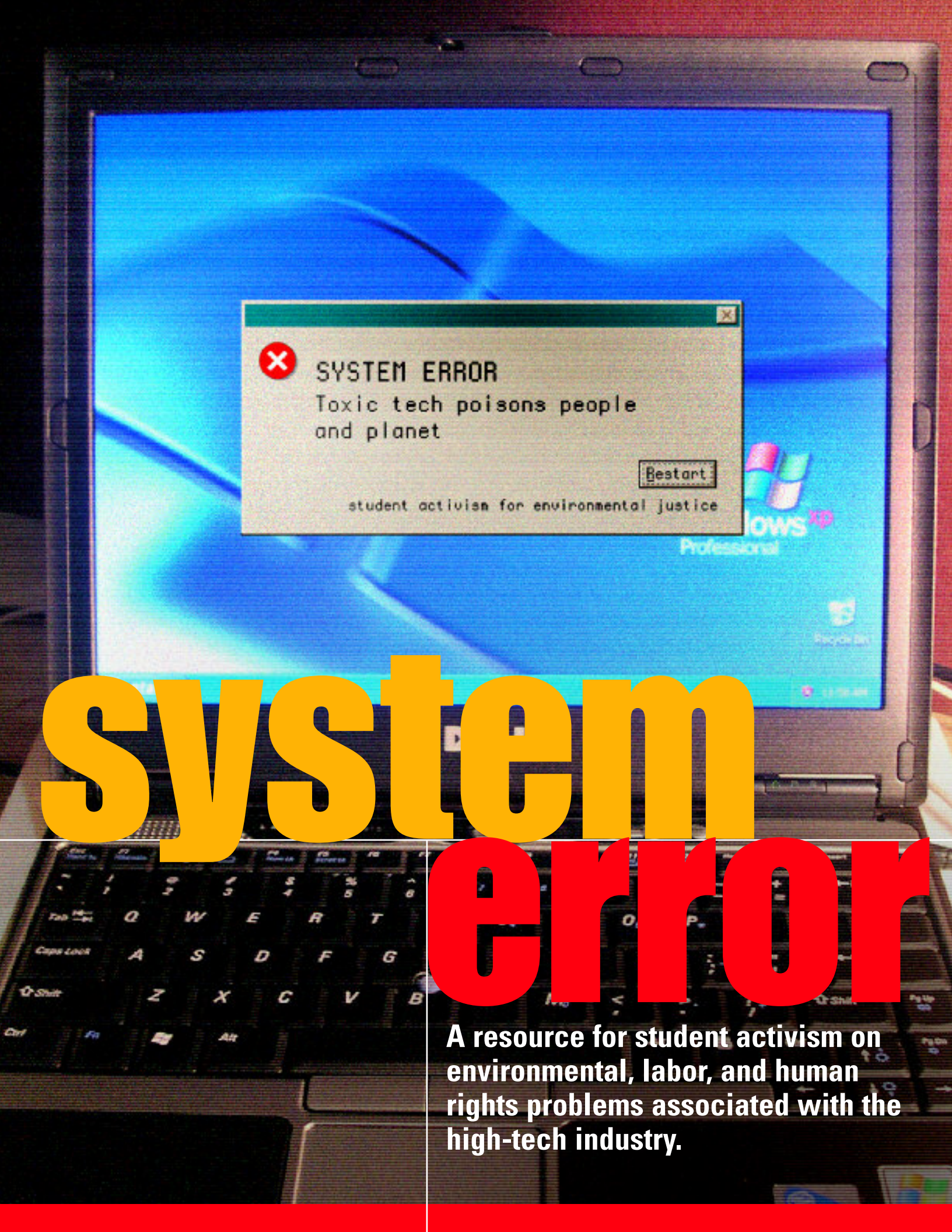

system error

A resource for student activism on environmental, labor, and human rights problems associated with the high-tech industry.

System Error

toxic tech poisoning people and planet

A resource for student activism on environmental, labor and human rights problems associated with the high-tech industry.

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December, 2005

This report is for students concerned about the environmental, labor, and human rights problems associated with the high-tech industry. It will provide you with information and action ideas to make changes on your campus, as well as contact information for organizations working on these issues. This report will help you take local action to address a global problem.

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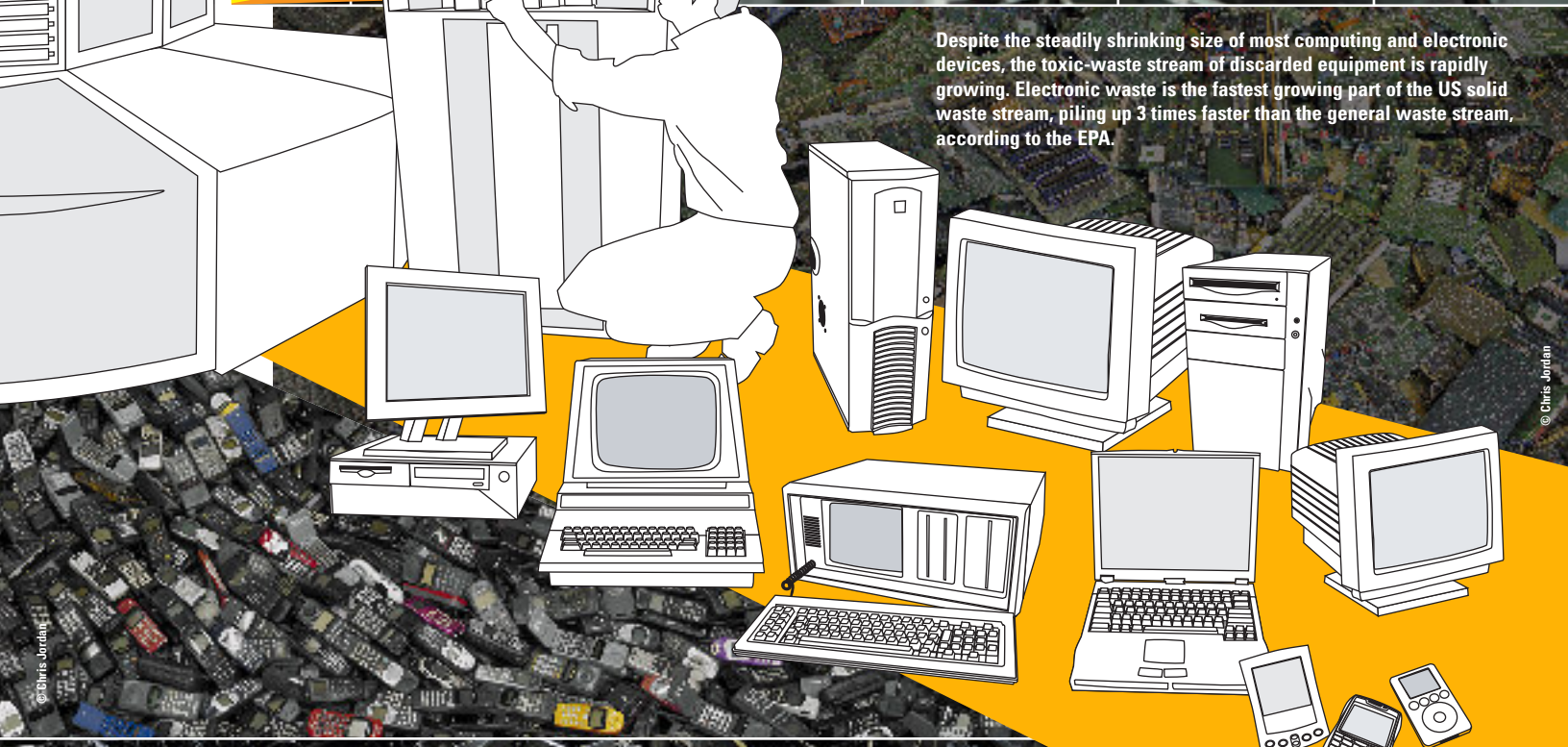

Despite the steadily shrinking size of most computing and electronic devices, the toxic-waste stream of discarded equipment is rapidly growing. Electronic waste is the fastest growing part of the US solid waste stream, piling up 3 times faster than the general waste stream, according to the EPA.

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When most people in the US think "high-tech revolution," they think of the rapid growth and change in the use of technology in everyday life, from computers, stereos and televisions, to video games, digital music players, and cell phones. For those plugged in to the high-speed, high-fidelity, high-tech lifestyle, the conveniences seem endless.

INTRODUCTION

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But there is an underside to this revolution. The high-tech industry has ushered in the equally rapid growth of a largely unregulated global industry whose billions in profits come from trashing workers, communities, and the environment all along the product chain, from production to disposal, and from toxic high-tech manufacturing sweatshops to electronic waste dumping on poor communities. Because computers and other electronics contain vast quantities of toxic material, they create a significant threat to human health and the environment globally.

Colleges and universities wield significant dollars in electronics purchasing. Through a tool called Environmentally Preferential Purchasing, colleges and universities can leverage their purchasing power to protect workers, communities, and the environment *as well as* promote responsible re-use and recycling of obsolete and discarded electronics.

Every year, campuses across the US dispose of thousands of tons of electronic equipment. California campuses alone replace roughly 25% of their computers, annually.[1] Instead of shipping them to a responsible domestic recycler, Californians, just like people in most states, send the majority of these machines overseas, where reclamation processes pollute poor communities. Or ever increasingly, we send electronic waste (e-waste) into US prisons, where captive workers handle hazardous waste without proper rights or protections.

California's more than 2.5 million undergraduate,[2] community college, and technical school students use over 3 million computers[3] to access email and class materials, to download music, and to surf the internet. On average, both students and the colleges they attend replace their computers every four years, creating over 15 million pounds of electronic waste annually, just in California.

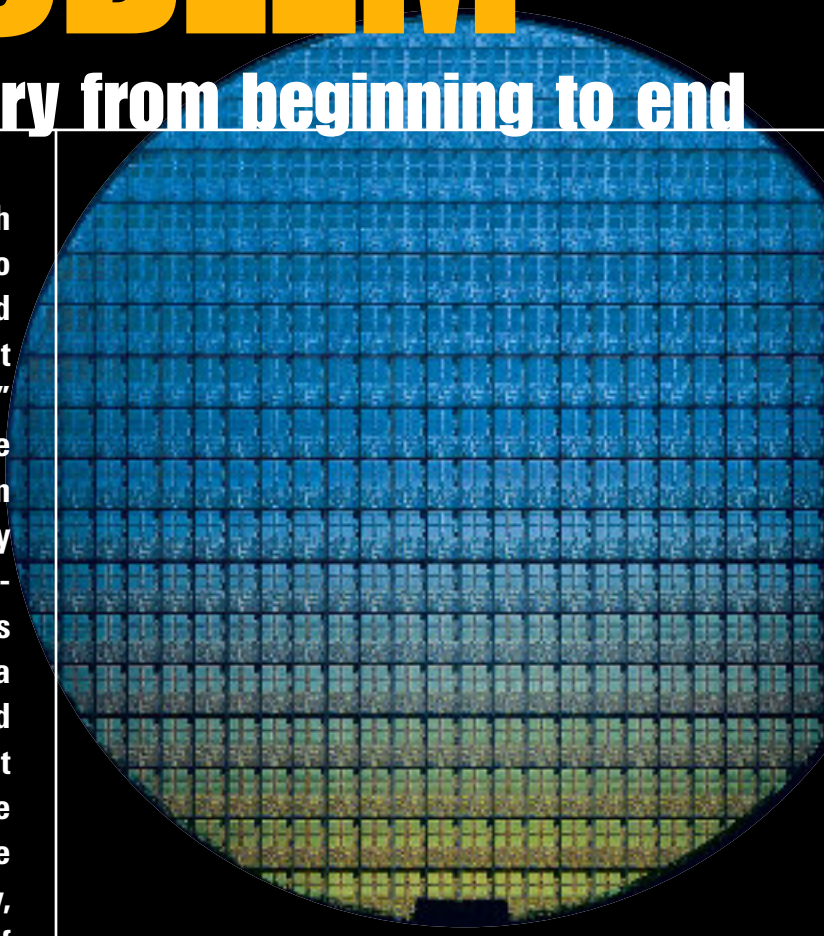
Students have always been a powerful force for change. By organizing, leveraging their power, and educating other students, staff, faculty, and administration, students have played a central role in diverse movements for decades. From divestment struggles since the 80s that helped bring down regimes including South Africa's racist Apartheid government, to the successful campaigns of United Students Against Sweatshops, to the Go Solar Campaign that brought clean energy to campuses across California, student organizing has moved massive institutions to do the right thing.

Now it is time to marshal student power to clean up the high-tech industry. Armed with this report and other student organizing tools (see the end of this report for resources), you can raise your voice, bring students together, and target decision makers to force improvements in the labor, community, and environmental performance of the high-tech industry, one of the most far-reaching polluters on the planet. The time has come to take action to stop the toxic high-tech cycle.

THE PROBLEM

An Unclean Industry from beginning to end

The birth of the high-tech industry gave rise to one of the most widely held myths of the industrial age—that electronics is a "clean industry." Promoting images of pristine "clean rooms" with workers in white coats and masks carefully assembling circuit boards, computer component manufacturers disguise this heavy industry as a hybrid between white collar and light industry. The truth is that electronics manufacturing is one of the most resource-intensive industries in human history, demanding huge amounts of water, energy, plastics, metals and chemicals. Its manufacturing processes use over 1000 chemicals, many of them known or believed to be carcinogenic, mutagenic, or reproductive toxins, which can have a profoundly deleterious impact on worker health and on local communities where waste is dumped.



The environmental weight of one six inch wafer of semi-conductor chips is 360 times the actual weight[4]

3200 cubic feet of bulk gases

22 cubic feet of hazardous gases

2,275 gallons of deionized water

20 pounds of chemicals, and

285 kilowatt hours of electrical power.

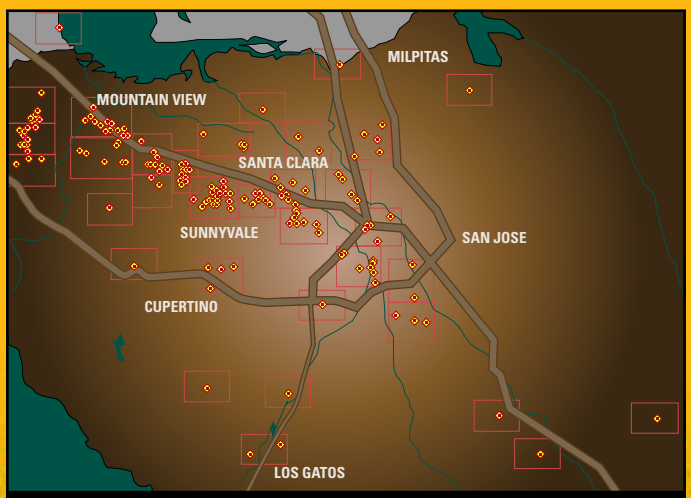
A Chemical Cocktail

One of the most notorious toxic chemicals used in high-tech production is trichloroethylene (TCE), which is used to wash semiconductors. TCE is a known endocrine disruptor and cancer-causing agent. Endocrine disruptors mimic, stimulate or block normal production of hormones, which govern growth, development, and reproduction. Women who worked in semiconductor fabrication rooms were found to have rates of miscarriage 40% or more above non-manufacturing workers. According to the US Environmental Protection Agency, "TCE poses a higher health risk than previously understood for susceptible populations (infants and young children, people with chronic disease, and people with higher background exposures)."[5] Individuals who have suffered from brain, stomach, and other cancers after working in semiconductor fabrication rooms are engaged in ongoing legal battles with the companies that employed them.

TCE and other toxics have leaked into groundwater from storage tanks beneath semi-conductor manufacturing plants. In Silicon Valley, the birthplace of the high-tech industry, there are 24 sites listed on the National Priorities List (Superfund Sites) for clean up of contaminated soil and water caused by high-tech manufacturing facilities, the highest geographical concentration in the United States. Many of these sites were recognized in the mid-1980s after a coalition of laborers, environmentalists, parents, fire fighters, and community members in and around Silicon Valley organized against pollution of their groundwater.[6] They won a lawsuit against Fairchild Semiconductor demanding the clean-up of its San Jose manufacturing facility and the groundwater it polluted. Twenty years later, cleanup is still continuing on these sites and contamination continues from old and new factories around the world.

In 1999, the seriousness of exposures suffered by clean-room workers was confirmed by US Bureau of Labor Statistics data, which showed that the rate of missed work due to sickness as a result of "exposure to caustic, noxious or allergenic substances" was 2.5 times higher for electronics industry workers and 3.75 times higher for semiconductor workers than the average for all manufacturing workers. The real numbers are thought to be much higher. A study of the reporting of occupational illnesses in California found that semiconductor companies reported less than half of all cases they should have under OSHA criteria.[7]

Water use in high-tech is among the highest in any industrial sector. Leading manufacturing facilities in the US each use well over 2 million gallons of water every day, enough to satisfy the needs of 30,000 people.[8] That is approximately the same as the student population at the University of California, Berkeley. These factories are often located in areas where intense pressures on the local water supply already exist. High-tech factories use more than their fair share and pollute what is left.



SANTA CLARA COUNTY GROUND WATER CONTAMINATION SITES

LIFE CYCLE OF THE PERSONAL COMPUTER

Design

Design for the dump: The average length of time for PC development, from drawing board to shelf, is three years, and consumers replace PCs about as frequently.

Lack of strong chemical policy: Toxicological assessment of tools and materials used in the manufacturing process are inadequate, as is regulation of material and chemical use.

No market incentives for responsible design: Manufacturers must redesign products without the toxins, but their engineers are neither evaluated nor rewarded on their ability to understand new or unusual health hazards or to develop environmentally sound design.

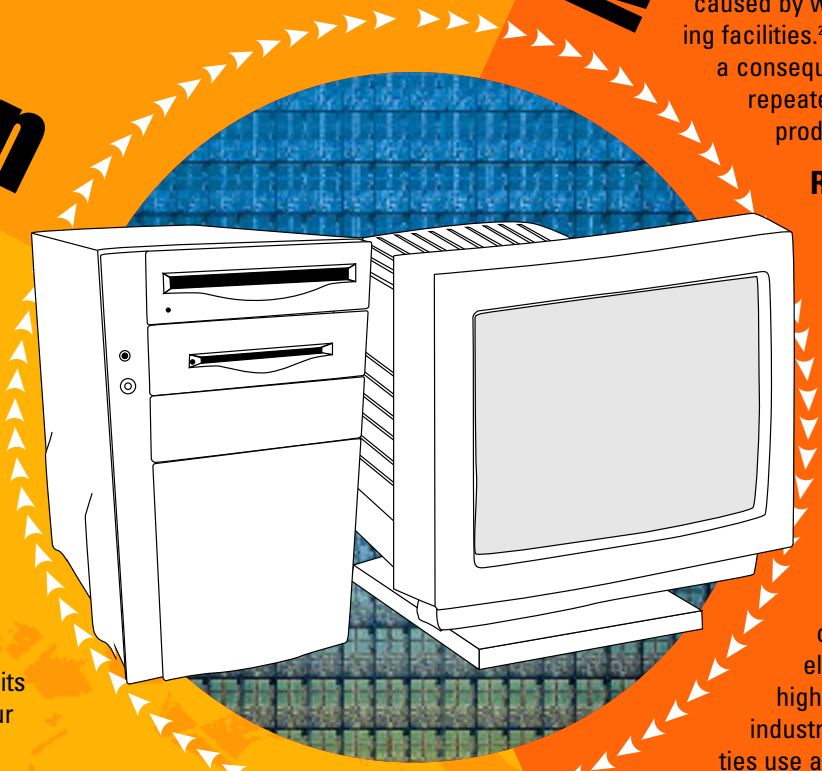
Solutions can be found in creative design and green chemistry that protects worker, community, and environmental health.

Manufacturing

Worker exposure to carcinogenic, mutagenic, and reproductive toxins: Studies show that women who worked in semiconductor fabrication rooms were found to have rates of miscarriage of 40% or more above non-manufacturing workers.[1]

Groundwater Pollution: In Silicon Valley, the birthplace of the high-tech industry, there are 24 sites listed on the National Priorities List for cleanup of contaminated soil and water caused by waste from high-tech manufacturing facilities.[2] Soil and water contamination is a consequence of the high-tech industry repeated throughout the world, from production to disposal.

Resource Intensive: The environmental weight of semiconductors far exceeds their small size. 1672 grams of fossil fuel and chemicals are needed to produce one DRAM (2 gram) chip (more than 630 times the weight). One six inch wafer of semiconductor chips requires 3200 cubic feet of bulk gases, 22 cubic feet of hazardous gases, 2,275 gallons of de-ionized water, 20 pounds of chemicals, and 285 kilowatt hours of electrical power.[3] Water use by high-tech is among the highest of all industrial sectors; most high-tech facilities use around 600 million gallons/year.[4]



Heavy metal contamination: 70% of heavy metals found in landfills, including mercury and cadmium, come from electronic equipment discards.[5] Lead has been found to leach into groundwater and contaminate workers clothes from even the most "state of the art" landfills, making its way to our homes and our drinking water.

Flame retardants: Brominated and other Halogenated flame retardant chemicals used in the plastics of electronic products can leach out of landfills into soil and groundwater.

Disposal

Incineration: Many places in the US burn solid waste. When incinerated, PVC coating and heavy metals from e-waste are released as a combination of toxic dioxins, furans, and fly ash. Dioxins and furans are among the most toxic compounds known to humans.

Landfill ban: Some states are instituting landfill bans on electronic waste. In 2001, for example, CRT monitors, televisions, camcorders, and other electronic devices were banned from landfills in California. However, without sufficient standards for proper recycling to protect workers and local residents, e-waste will end up polluting poor communities in the US and abroad.

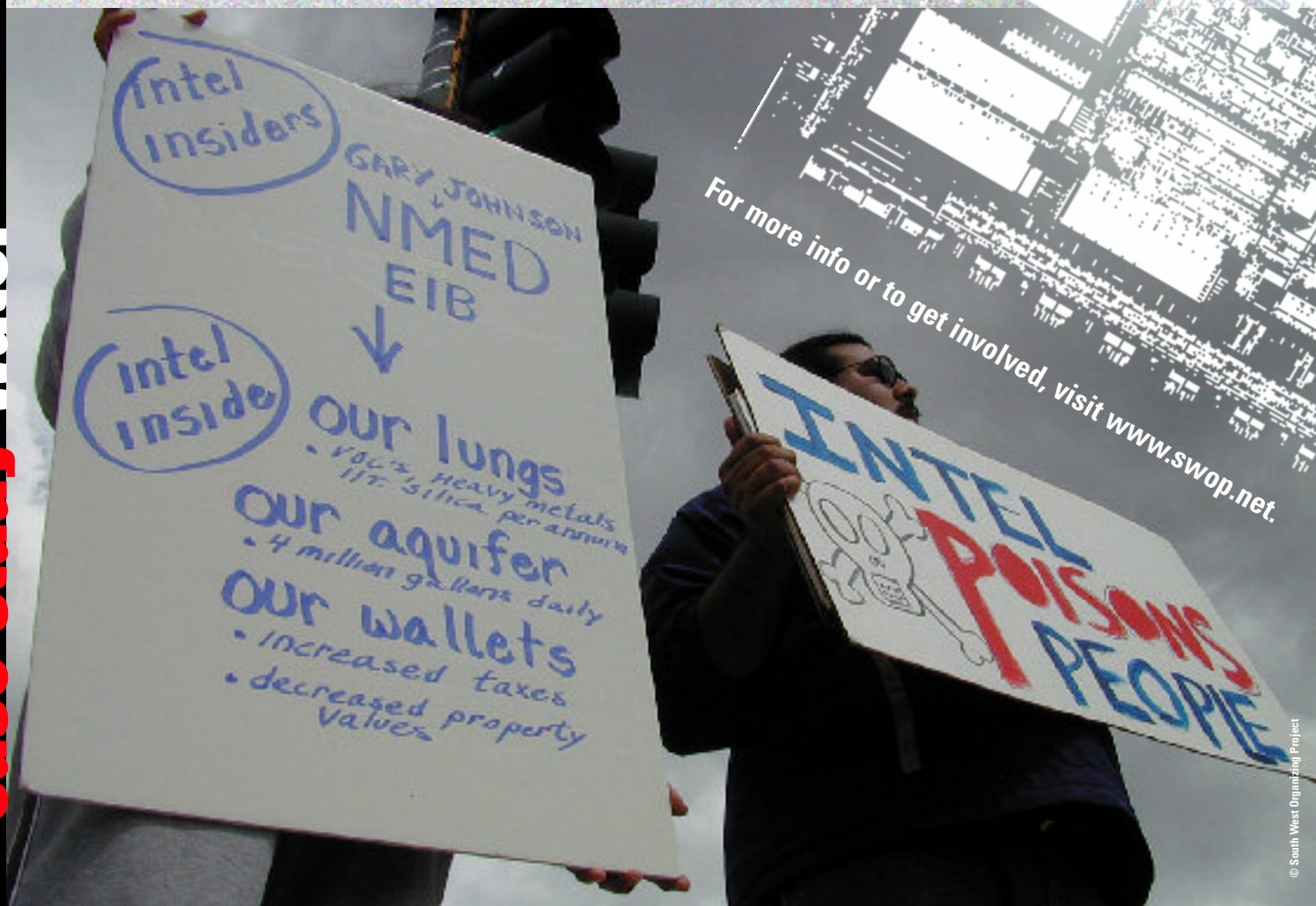
Intel Inside New Mexico

Sucking the Southwest Dry

The explosion of high-tech development in the Southwest means that the region's already sparse water supplies must meet the needs of one the world's fastest-growing—and thirstiest—industries.

In 1993, Intel received the largest corporate welfare package in the country's history to construct a facility in Rio Rancho, New Mexico.[9] Since then, the SouthWest Organizing Project (SWOP) has been holding Intel accountable to protect New Mexico's environment and economy. In New Mexico—the 48th poorest state and the third most arid state in the US—87% of the water used by the top industrial users in the Albuquerque area is by the five high tech companies: Intel, Philips, Sumitomo, Motorola, and Honeywell.[10] The average residential user in Rio Rancho, a suburb of Albuquerque, pays $1.75 per 1000 gallons of water. Intel pays, on the average, 41¢ per every 1000 gallons it uses—one-fourth the cost to residential users. Intel uses 3-4 million gallons of water per day at their Rio Rancho plant, or around 1.5 billion gallons of water per year. *In the desert*. In 1997, Intel negotiated to buy water rights from Southern New Mexico. SWOP and residents from the area opposed the sale and won.

Long-term impacts of the high-tech electronics industry on Albuquerque's water resources and infrastructure are already being seen. From threatened destruction of ancient cultural practices and value systems to water pricing mechanisms and policies which penalize residents in order to reward high tech companies, excessive water use has depleted Albuquerque's life-blood aquifer and contaminated precious water resources.



Health impacts and the fight for workers remain, long past the jobs

Poisoned Workers Take On AXT

AXT is a semiconductor company founded in 1986 in Silicon Valley that knowingly exposed workers to over 21 times the permissible limit of arsenic. Only after AXT fired over 500 of these workers and moved its operations to China did the workers learn of the exposure, leaving them in the shadow of potential cancers and other diseases.

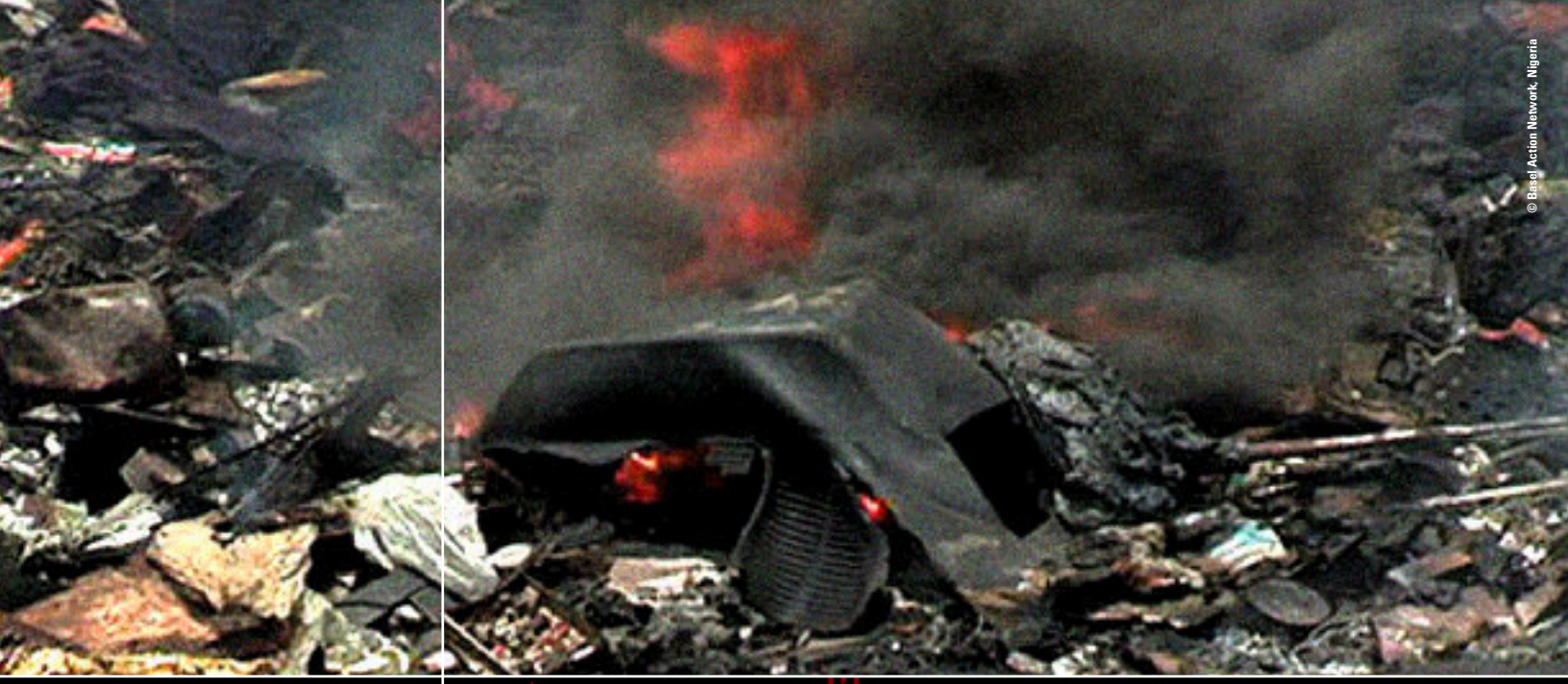
From the day the factory opened, workers were exposed to toxic gallium arsenide. After repeated findings of exposure, in May 2000, the State of California issued 42 citations to AXT for, among other things, willfully exposing workers to arsenic, allowing its ventilation system to degrade, failing to train employees in handling arsenic, withholding respirators and other protective gear, and failing to notify employees that they had been exposed.

In 2004, several laid-off workers came to Power in Asians Organizing (a project of the Asian Pacific Environmental Network) to ask for help. PAO/APEN is now part of a coalition with community health and legal experts to support the workers, including the Asian Law Caucus, Asian Health Services, the UCSF Community Occupational Health Services, and others. A campaign was born to seek redress for the workers, including a long-term medical monitoring fund and protection for the new workers in China.

Today, almost 300 former AXT workers are involved in this struggle for justice, organizing and speaking out about their experience. To learn how you can help, contact APEN at http://www.apen4ej.org, or call 510.834.8920.

"The safeguard the company offers includes a paper mask, a pair of rubber gloves, and an ordinary work suit. In my experience, the so-called workplace safety training was not provided till they received ticket from the government and thus, had no other choice. Even so, the training was just like a dragonfly skimming the surface of the water."

Zheng Li, AXT worker, 1997-2002



Where Does All of the Toxic Trash Go?

Every new electronic product, whether a computer, cell phone, television, or iPod, is future waste. Electronic waste is the fastest growing waste stream in the US. The EPA estimates that we get rid of 3 million tons of outdated or broken electronic devices annually. Electronic products last on average only a few years, and only a small percentage, far less than 20%, according to the EPA,[11] is recycled using responsible operations in the US. The vast majority of e-waste ends up in storage, landfills, waste incinerators, or it is exported to developing countries where intensive salvage operations manually recover materials such as plastics and copper. Some of the toxic e-waste also ends up in state and federal prisons in the US, exposing captive prison workers to these hazardous materials. The wealthier consumers and nations have created a toxic waste stream that washes over the whole world, flooding poorer communities everywhere.

Some states, such as California, legally require colleges and universities to use a "recycler" when discarding their electronic waste. However, this does not ensure that campus computers are recycled with an eye to environmental or community sustainability.

Instead, electronic "recyclers" often opt for the cheap and profitable alternative of sending computers and parts to China, India, Nigeria, and other countries where low-wage workers, including children, manually recover valuable scrap materials under horrendous conditions and are exposed to a litany of toxins. In India, for example, 25,000 workers are employed at scrap yards just in Delhi, where up to 20,000 tons of e-waste are handled each year. Computers make up one-quarter of this waste.[9] The small, short-term economic gains for communities eclipse preventable long-term damage to human health and the environment. Residents face the unacceptable dilemma of having to choose between dangerous toxic work or no work at all. The refusal of many US corporations, waste brokers, government agencies, and universities to pay the full costs of responsible e-waste management has thus created a flood of toxic trash from wealthy countries to the world's poorest communities. E-waste operations in China and India were documented in the video and report "Exporting Harm," by the Basel Action Network (BAN) and Silicon Valley Toxics Coalition. In 2005, BAN released a new documentary and report on e-waste in Nigeria called "Digital Dump."

The Basel Convention

The Basel Convention on the Control of Transboundery Movements of Hazardous Wastes and Their Disposal was adopted in Basel, Switzerland on March 22, 1989 in response to the international hazardous waste trafficking scandals of the 1980s. In its early years, the Basel Convention was condemned by environmental rights advocates and "developing" countries for failing to ban hazardous waste exports to any location other than Antarctica. Since that time, however, "developing" countries and environmental rights advocates have successfully created an amendment to the Convention, which bans the export of hazardous waste, for disposal and recycling, from all countries that have ratified and implemented the amendment to all "developing" (non-OECD/EU) countries. The US is the only "developed" country that has not ratified the Basel Convention, making it legal for US businesses to export toxic waste, even though it is illegal for many countries to accept this toxic waste from the US. This major loophole results in the US dumping massive quantities of its toxic e-waste on "developing" countries. From The Basel Action Network (www.ban.org)

Known and Suspected Routes of e-waste Dumping

There is currently no system for tracking legal or illegal (under international law) shipments of electronic waste, and therefore, there is no quantitative data on volumes or even all of the true destinations. Some electronic waste is shipped as "working equipment" only to end-up as waste upon arrival. This map indicates information collected through investigations by organizations such as the Basel Action Network, Silicon Valley Toxics Coalition, Toxics Link India, SCOPE (in Pakistan), Greenpeace and others.

Dumping and the World of Electronic Waste

Cathode Ray Tube Monitors: Each monitor or TV has a minimum of 4-8 pounds of lead, a known neurotoxin and carcinogen. At these large recycling camps in China, CRT monitors are either smashed with hammers or thrown against rocks to recover copper coils inside. This process exposes workers to lead dust and creates working hazards from broken leaded glass. The unwanted leaded glass is openly dumped or pushed into rivers, spreading tons of lead throughout the region.

Integrated Circuit Boards: Circuit boards are placed on shallow plates heated over barrels filled with ignited coal. The plates contain a pool of molten lead and tin solder, which creates significant lead fumes. The circuit boards are heated in the solder mix until the semiconductor chip can be separated from the board. Then, the board is stripped of its capacitors using wire clippers and sent to riverside operations dedicated to gold recovery, where a 100% acid solution is used to retrieve gold, and then the acid is dumped directly into the nearby river.

Plastics: Housings, keyboards, and monitor casings are shredded or cut into small pieces, which are then re-melted in rooms with little or no ventilation and no protection for the workers. Burning of these plastics releases carcinogenic hydrocarbons, including dioxins and furans.

Printer Toner: Workers open printer cartridges with screwdrivers, and use paintbrushes or their bare hands to collect cartridge toner into a bucket. Workers engaged in this process often wear no protective respiratory equipment, allowing them to inhale toner dust. By the end of the day, their skin and clothes are coated with the toxic dust.

Wires and Cabling: Wires are often taken to makeshift shacks, housing families that are living and working where they sort wires by day and burn them in open fires at night, in order to recover copper. This low temperature melting of the PVC plastic coating on the wires results in the generation of highly toxic chlorinated dioxins and furans.

Toxic Sentence

The use of prison work programs to dismantle electronics is a disturbing trend in domestic US handling of e-waste. As with export dumping, prison e-waste recycling facilities operate in substandard conditions, far removed from public scrutiny. Publicly subsidized prison facilities, exempt from minimum wage laws, unemployment insurance, and adequate health and safety oversight, operate as high-tech sweatshops in the US. Prison workers are often forced to use inferior tools, denied adequate safety equipment and the right to organize, paid pennies an hour, and experience retaliation for speaking out about working conditions.

November 2003, Fire at Atwater Prison in California in which computer monitors and televisions at the UNICOR electronic 'recycling' facility went ablaze.

The largest prison e-waste operation is run by Federal Prison Industries, also known as UNICOR. UNICOR is a business interest owned by the Department of Justice through the Bureau of Prisons.

UNICOR's e-waste recycling business model depends on exploitation of workers, preferential treatment for government contracts, and intensive use of manual labor that needlessly exposes prison workers to toxic substances including lead, beryllium, cadmium, and brominated fire retardants—all materials of concern to human health. *Poor people and people of color, who make up 70% of the prison population[14] and the vast majority of UNICOR's work force, are disproportionately affected by the Federal Prison Industries practice of managing hazardous electronic waste with substandard technologies. This is environmental racism.*[12]

Various recent investigations by journalists, the Department of Justice, the Occupational Safety and Health Administration, and the Silicon Valley Toxics Coalition into UNICOR practices reveal that prison workers have been exposed to dangerous toxins and that prison workers and prison guards have registered serious complaints regarding operations.[15]

Export dumping and prison labor contribute to the destruction of communities and the environment, while undermining the viability of responsible recycling operations. Responsible, domestic recycling can provide good, clean, green jobs, but cannot survive in a market dominated by abysmally low wages, worker abuse, and environmental negligence.

case study unicor

"Unsafe for Public Dumps But Not for Us Lowly Inmates"

Since the Silicon Valley Toxics Coalition began exposing the conditions in prison e-waste work program, particularly UNICOR, we have received letters and statements from people working in these facilities attesting to health problems, retaliation, lax safety standards, and other routinely abusive behavior in the system. Personal identity information has been removed to protect people from retaliation.

For more information on the prison labor and e-waste, read our other reports "Toxic Sentence," "A Tale of Two Systems," and "Dismantling Communities," available at www.svtc.org.

"I work just outside [the CRT glass breaking area], and am offered no ventilator, and they won't give us blood tests. It's a Mickey Mouse operation, and inmates are knowingly being subjected to chemical cocktails—and that is the bottom line. We are guinea pigs and slaves, and treated precisely that way."

—UNICOR prison worker

"NONE of what we are doing in this plant would be used in a for-profit venture, as it would be too dirty and/or too hazardous to do, plus the EPA and OSHA would shut them down for I-don't-know-how-many violations. Because we are merely federal prison inmates, the BOP can get away with the hazardous conditions we face daily."

—UNICOR prison worker

"[UNICOR electronic recycling] amounts to slave labor to avoid compliance with safety and health regulations that affect many inmates."

—UNICOR prison worker

"There was no mention of the risk to any of the inmates while I was working there [or] that these materials were by any means hazardous to our health… While I was there and working in the factory, all of the inmates were housed in separate units, which only housed the inmates that worked in the factory. And also we were given our lunch meals inside the factory where these hazardous materials were located. Which means we were not only inhaling these dangerous materials but also consuming these materials as well."

—Former UNICOR prison worker

"Funny, isn't it, how this stuff is unsafe for public dumps, but not for us lowly prison inmates?!? Quite the double standard, wouldn't you agree?"

—UNICOR prison worker

Prison recycling operations exist on the local, state and federal level in many states. UNICOR operates facilities in seven states and takes contracts from across the country. The following colleges, universities and towns have contracts with UNICOR for e-waste.[16] Do they know that they are poisoning people?

Colleges & Universities

Penn State University
University Park, PA

University of Colorado at Boulder
Boulder, CO

Michigan State University
East Lansing, MI

University of Maryland
College Park, MD

University of Connecticut
Storrs, CT

Bucknell University
Lewisburg, PA

Kent State University
Kent, OH

Johns Hopkins University
Baltimore, MD

Youngstown State University
Youngstown, OH

State & City Governments

City of Manteca, CA

Louisville Metro SW District
Louisville, KY

City of Auburn
Auburn, AL

GJMV Solid Waste District
Wellston, OH

Recycle Ann Arbor
Ann Arbor, MI

ACTION ITEM

Do you know where your campus e-waste goes? Find out who is in charge of electronics purchasing and disposal on your campus and how they handle the waste. The first step to cleaning up the act on your campus is tracking down the problem.

© Basel Action Network, Nigeria

Local and Global
Environmental Impacts

© Greenpeace/Natalie Behring

Contamination from unsafe manufacturing, recycling and disposal operations pollute soil, air and water in communities of operation, and damage the environment of neighboring communities. Lead concentration in the water system of Guiyu, China is at least 190 times greater than deemed drinkable by the World Health Organization.[17] Sediment samples show lead levels in a Guiyu river 212 times greater than levels defined as hazardous in the US or European Union.[18] The e-waste operation's contamination of Guiyu's water supply has necessitated trucking in water daily from a village 30 km away.

Lead is only one disturbing toxin among many in electronics. Lead is known to cause damage to the nervous system and blood and to impact kidneys and reproduction. Of particular concern is the impact that even low-level exposure to lead can have on children's brain development, resulting in learning, social, and psychological problem for life.[19]

A study by Chinese medical researchers released in April 2004 concluded, "e-waste treatment, such as incineration of the circuit board and cleaning of the plastic, causes direct damage to human skin: most of the migrant laborers taking up incineration of the circuit board have symptoms like headache, vertigo, naupathia, and so on."[20]

The level of chromium contamination, another computer-specific toxin, in Guiyu was 1338 times the EPA threshold level.[21] These samples merely give a glimpse into the overall degradation of the region's environmental health.

Toxins do not respect geographical boundaries. When computer casings and parts are burned for energy or to 'mine' copper or gold, heavy metals and other toxic substances are released into the atmosphere. The dioxins and furans thus created are dangerous carcinogenic air pollutants, which can travel across oceans and continents in a matter of days and persists in the environment. They also travel up the food chain, concentrating in humans where they do not easily break down in the body.

Currently, there is insufficient economic, political, public and legal pressure for social and environmental responsibility in the electronics industry. Electronics design engineers are not rewarded for green chemistry, for design for recycling, or for extending the useful life of products. This industry must be pressured to create products that are less toxic, less chemical-intensive, and easier to responsibly manage at the end of their useful life. There is also an enormous need for promotion of worker rights, community health, and environmental justice throughout the production, consumption, and waste chain of the industry.

Body Burden

Computers and other electronics contain a disturbing toxic cocktail of chemicals used in components and manufacturing processes, which are known or believed to be linked to a host of adverse health impacts. Exposure to toxins is most severe for workers and communities whose water or air is contaminated by these facilities. Some of these toxins can effect users and the general population, through dispersion into the environment from landfills and incineration. These are just a sample of the toxins and their potential impacts on humans.

Occupational health and animal studies, as well as understandings of similar materials, have led to calls for fundamental changes in how electronics are produced and managed. In the European Union, for example, new regulations on electronics take into account concerns regarding many of the these chemicals and restrict their use and handling.

Better Safe than Sorry

Thankfully, we do not study the toxic effects of chemicals by intentionally exposing humans to see the results. Unfortunately, that means we often do not restrict chemical uses, even when there may be evidence pointing to potential harm, until there has been widespread exposure to people. That makes workers and communities where these materials are produced and disposed the "canaries in the coal mine" of toxicity assessment. This is particularly disturbing in high-tech, where rapid changes introduce new materials regularly without sufficient protection for people and the planet.

There is, however, a better way to guide decisions about material: The Precautionary Principle. The Precautionary Principles is the simple idea that if there is reason to believe that something may cause harm to people or the environment, then it is better to avoid it than to risk doing harm, even if there is not yet a conclusive "cause and effect" relationship. By applying this rule, the burden is on corporations to demonstrate that their materials are safe. Currently the public is left waiting for bad things to happen before action is taken.

For more on the precautionary approach and chemical policy, visit the Science and Environmental Health Network at www. sehn.org.

Selenium
Exposure to high concentrations causes Selenosis, which can cause hair-loss, nail brittleness, and neurological abnormalities (i.g. numbness and other odd sensations in the extremities).[12]

Beryllium
Exposure can cause lung cancer and chronic beryllium disease (beryllicosis) (affects lungs).[3]

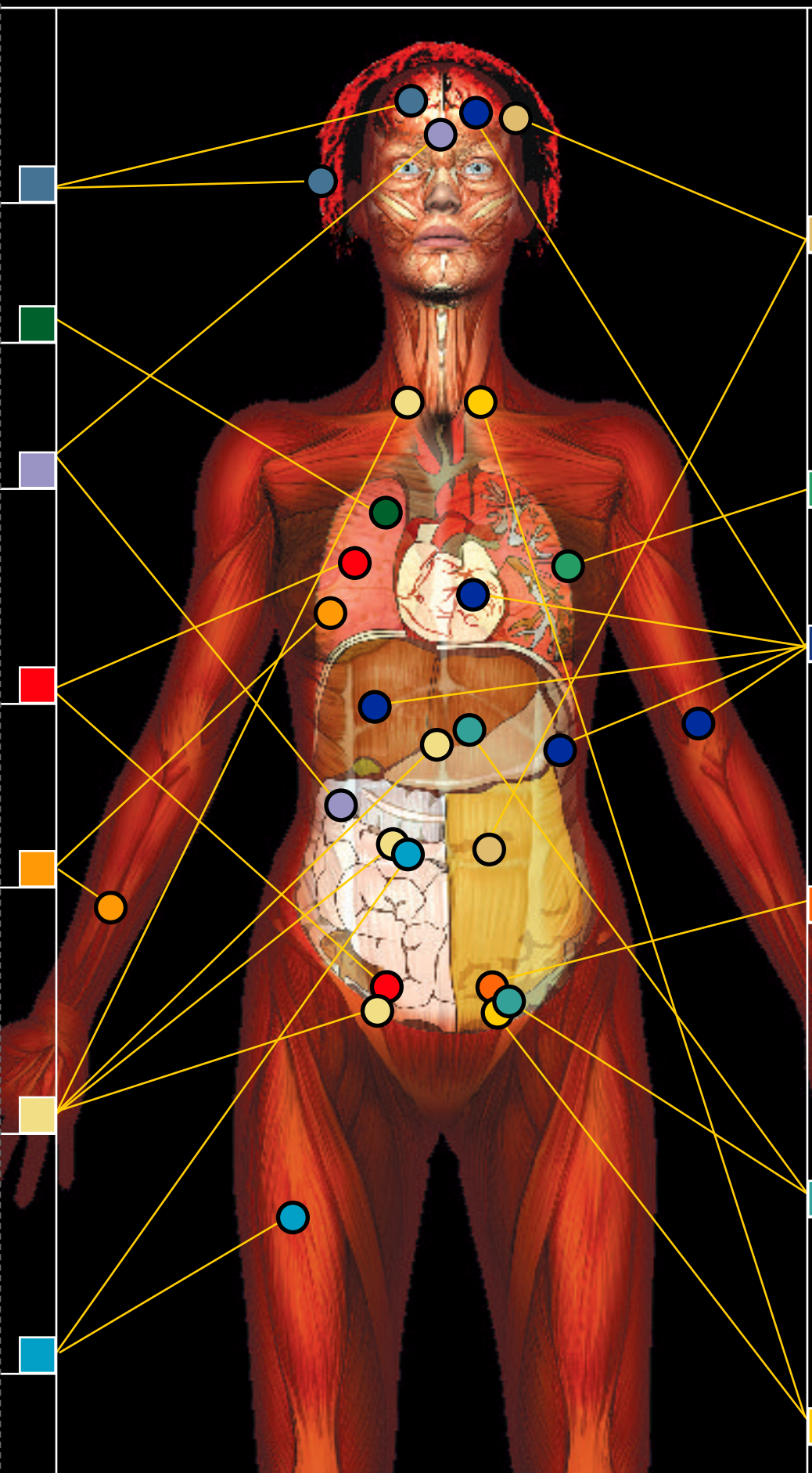
Mercury
Exposure through ingestion or inhalation can cause central nervous system damage and kidney damage.[9]

Chromium (IV) - Hexavalent Chromium
Exposure can cause strong allergic reaction (linked to Asthmatic Bronchitis) and DNA damage to cells. Workers are exposed at disposal stage and Chromium (IV) can also be released into the environment from landfills and incineration.[6]

Arsenic
Long-term exposure may cause lung cancer, nerve damage and various skin diseases. Arsine gas (AsH3), used in tech manufacturing, is the most toxic form of arsenic.[1]

Trichloroethylene (TCE)
Exposure to TCE (depending on amount and route) can cause liver and kidney damage, impaired immune system function, impaired fetal development, or death. Manufacturing workers and communities where TCE leaches into drinking water are at greatest risk.[13]

Cadmium
Long-term exposure can cause kidney damage and damage to bone structure is also a known carcinogen. Short term or acute exposure can cause weakness, fever, headache, chills, sweating, and muscle pain.[5]



Lead

Exposure can cause brain damage, nervous damage, blood disorders, kidney damage, and developmental damage to fetus. Children are especially vulnerable. Acute exposure can cause vomiting, diarrhea, convulsions, coma, or death.[8]

Polyvinyl chloride (PVC)

PVC is the most used plastic, found in everyday electronics. When burned it produces large quantities of hydrogen chloride gas, which combines with water to form hydrochloric acid (HCl). Inhaling HCl can cause respiratory problems. Production and incineration of PVC creates dioxins.[11]

Barium

Exposure may lead to brain swelling, muscle weakness, damage to heart, liver and spleen, or increased blood pressure.[2]

Brominated flame retardants (BFRs)

Suspected of hormonal interference (damage to growth and sexual development), and reproductive harm, BFRs are used to make materials more flame resistant. Exposure studies reveal BFRs in breast milk and blood of electronics workers, among others.[4]

Polychlorinated biphenyls (PCBs)

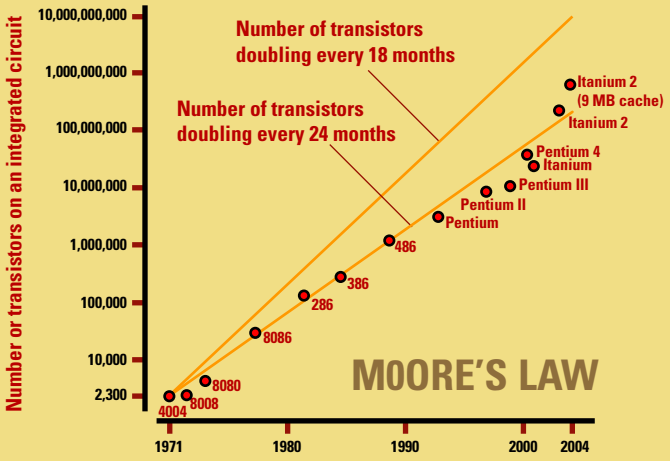
Toxic effects of PCBs include immune suppression, liver damage, cancer promotion, nervous damage, reproductive damage (both male and female), and behavioral changes. PCBs were widely used (prior to 1980) in transformers and capacitors. Though banned in many countries, they are still present in e-waste.[10]

Dioxins and Furans

Exposure can cause hormonal disruptions, damage to fetus, reproductive harm, and impairment of immune system. These highly toxic compounds bio-accumulate (concentrate in the body) and persist in the environment.[7]

SOLUTIONS

What You Can Do



MOORE'S LAW

The guiding benchmark of the high-tech industry: *The computing power of a microchip will double every eighteen months relative to its size and price.*

Attributed to Gordon Moore, founder of Intel, 1965

OUR VISION

The benchmark that should drive the high-tech industry: *Each new generation of technical improvements in electronic products will include parallel and proportional advances in social and environmental justice.*

Silicon Valley Toxics Coalition, 2005

MOORE'S LAW vs. OUR VISION

Raise the Bar, Apply Pressure and Force the Market to Change

Students and colleges play a huge role in the personal computer and electronics market. Your performance demands often set the standard for future development of computer hardware and software. What if the performance standards included environmental and social standards as well? What would happen if, with increases in speed and graphics, you demanded proportionate increases in workers' rights and recycled content? If colleges and universities committed to buying only mercury-free and brominated flame retardant-free computers in 2007, computer companies would adapt to meet that standard, or they would risk being left behind. Some universities and colleges in California, and across the country, are making commitments to responsible reuse and recycling and purchasing computers with fewer toxins. If students like you push your colleges to join this movement, the pressure can create a powerful driver for green design. We can set social and environmental standards for the industry and force companies to comply with these standards. Such organizing campaigns will benefit colleges, students, high-tech workers, communities and the environment.

If They Put the Toxics In, They Gotta Get 'em Out

Imagine if, instead of taking your garbage to the curb once a week, you had to store it in your bedroom. You'd quickly figure out how to produce less garbage, and would probably start by eliminating anything that made you sick.

In our current system, we are under the illusion that our trash disappears when we throw it away. In reality, it ends up in landfills or incinerators. If it is electronic waste, it probably ends up overseas. Our waste, in the end, becomes someone else's toxic contamination.

The things we throw away are designed for short-term use and long-term obsolescence, with little consideration of the effects of hazardous materials on workers, communities, and the environment. But electronics manufacturers knowingly use toxic materials, and they must not be allowed to pass the toxic burden they create onto consumers and workers.

Luckily, there is a system, implemented in other parts of the world, that works to push high-tech companies away from toxic-laden, design-for-the-dump manufacturing.

Extended Producer Responsibility (EPR)

is an emerging principle for a new generation of pollution prevention policies that focus on product systems instead of production facilities. EPR posits that if you put the toxics in, you own them, and you have to deal with the consequences; it stresses the responsibility manufacturers must take for the post-consumer stage, after equipment is discarded. It assumes that producers bear responsibility for upstream social and environmental impacts of their products arising from choice of materials and the manufacturing process, and downstream impacts from use and disposal of products.

If companies were held responsible for everything they made—even after a product is sold—they would be forced to regain as much value as possible. They would therefore tend to make products easier to disassemble and recycle, would not contaminate them with chemicals that make it impossible to recover glass or plastics, and would reduce the use of hazardous materials.

They Do It In Europe, Why Not Here?

Europe has taken the EPR approach to electronic products. The European Union adopted the Waste of Electrical and Electronic Equipment (WEEE) Directive in 2003, requiring "take back" services free of charge to consumers and large purchasers. By January 1, 2006, private householders in the European Union will be able to return their electronic waste to collection facilities free of charge, and producers (manufacturers, sellers, distributors) will be responsible for financing the collection, treatment, recovery, and disposal of e-waste.[22]

Unfortunately, these same services are not required in the US, making it more difficult for people in this country to responsibly dispose of electronic waste and giving the industry a free pass on toxic design. The lack of convenient pathways to responsible recycling and regulation of the industry makes toxic production, export dumping, and captive labor the paths of least resistance.

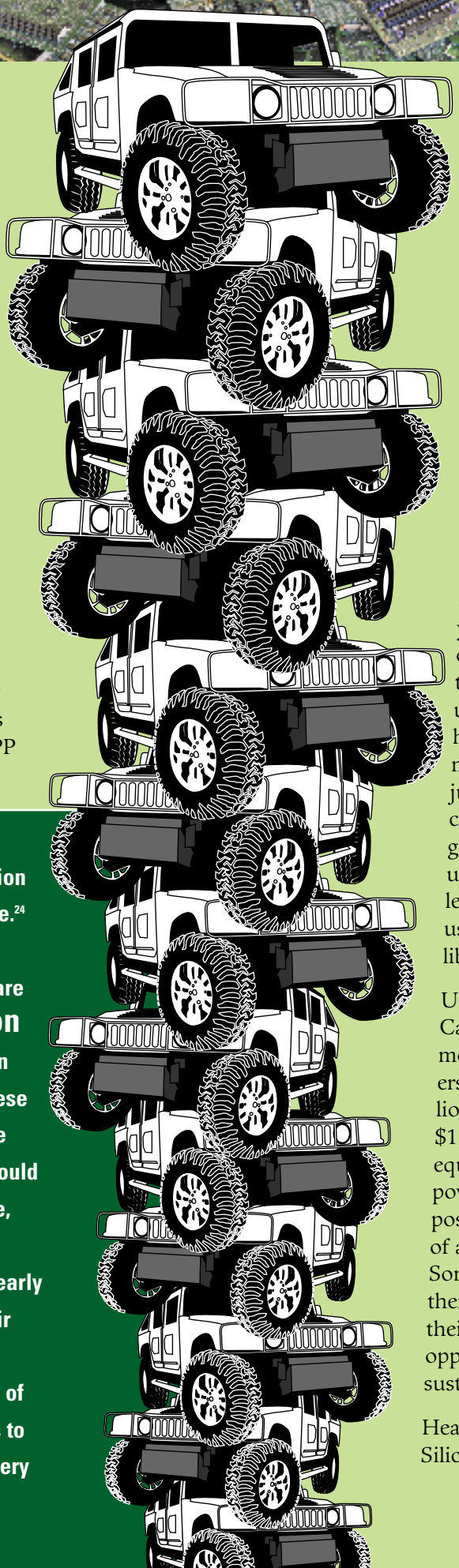
While the US has not required any strategic national program to ensure proper disposal and recycling of computers, several states have passed legislation targeting electronic waste in a patchwork attempt to protect communities from exposure to lead, mercury, and other high-tech toxics. But these laws have not slowed the spread of e-waste overseas and into prisons or created incentives for better designed products. Without a solid EPR strategy in the US, and without US compliance with the Basel Convention, 80% of e-waste originating in the US is dealt with improperly.

Through a blend of strategies, including corporate campaigns, state and national legislation, and campaigns to get institutional purchasers (including hospitals, states governments, colleges, and universities) to institute social and environmental criteria in purchasing guidelines, we can turn the tide against the toxic design-for-the-dump, profit-before-people attitude of the high-tech industry.

Leveraging Purchasing Power

A new movement in higher education for Environmentally Preferable Purchasing (EPP) is pushing to incorporate sustainability into purchasing requests and decisions via product criteria that reduce resource use, eliminate toxic products, and protect student and employee health.

Similar to "sweatshop-free" purchasing rules pushed by student demands, campuses are launching successful EPP programs in energy efficiency, building materials, and food for campus eateries, among other areas. Now is the time to implement guidelines for electronics, particularly in public institutions, such as the University of California or other state systems.



Universities are constantly working to upgrade computer power and function to keep up with technological research and student and institutional demands. Most schools have a three- to four-year replacement cycle. In order to keep up that pace and to continue adding capacity, universities and colleges will have to purchase almost one million computers every year just once. Additionally, today's college students are the first generation of lifetime computer users. Three-fourths of all college students report that they use the internet more than the library for schoolwork.

Universities and colleges in California, for example, own more than 1.75 million computers for student use, another million for faculty, and spend over $1.75 billion annually on IT equipment.[23] This kind of buying power can promote significant positive change in the standards of a quickly evolving industry. Some California colleges are therefore examining the scope of their purchasing and finding opportunities to promote more sustainable practices.

Health Care Without Harm, Silicon Valley Toxics Coalition,

California's student population is around 2.75 million people.[24] Roughly 55% of all students own a computer,[25] so there are approximately 1.5 million student-owned computers in California today. If all of these machines entered the waste stream today, the volume would equal 56,250 tons of e-waste, the equivalent of more than 13,000 Hummers. Nearly half of students replace their computers in their college career, bringing the number of computers used by students to well over two million for every four years.[26]

and the Computer TakeBack Campaign developed EPP procurement guidelines for personal computers and other information technology equipment. These guidelines help technology purchasers evaluate electronic equipment manufacturers and secondary providers on their commitment to toxics reduction and take-back (Producer Responsibility) programs. They require manufacturers to provide information on material use, offer take back services, guarantee responsible recycling, and meet energy-efficiency standards. Using these guidelines, you can join community-based and worker-based organizers, health care providers, and other campuses in demanding sustainable design, production, consumption, reuse and post-consumer management of electronics.

Instead of paying extra to have old computers recycled, campuses should demand that companies they buy computers from must take their old ones back free of charge and guarantee high-standard, responsible recycling that protects workers. Many people working in waste management and campus facilities are struggling to find ways of properly handling the e-waste they receive and to make sure recyclers they use are not exporting their waste overseas, or dumping it in landfills, incinerators, or prisons. That dilemma can be largely resolved if campuses build "take-back" demands into their purchasing contracts.

Environmentally Preferable Purchasing

EPP Procurement Guidelines use the following principles to minimize overall environmental costs.

Responsible End-of-Life Management

To strengthen environmental and worker protections worldwide, and provide incentives to build clean, safe domestic infrastructure for electronics recycling.

Upgradeability

To extend the useful life of equipment, and conserve resources used in manufacture and disposal.

Design for the Environment and Public Health

To encourage innovation in developing cleaner products with fewer toxins that are more easily recycled and less dangerous.

Clean Manufacturing

To ensure manufacturers properly monitor and minimize the health effects of computer manufacturing processes on workers.

Energy Efficiency

To reduce the energy use of products, lowering the cost of use substantially.

For a copy of the guidelines, contact Silicon Valley Toxics Coalition at StudentAction@svtc.org.

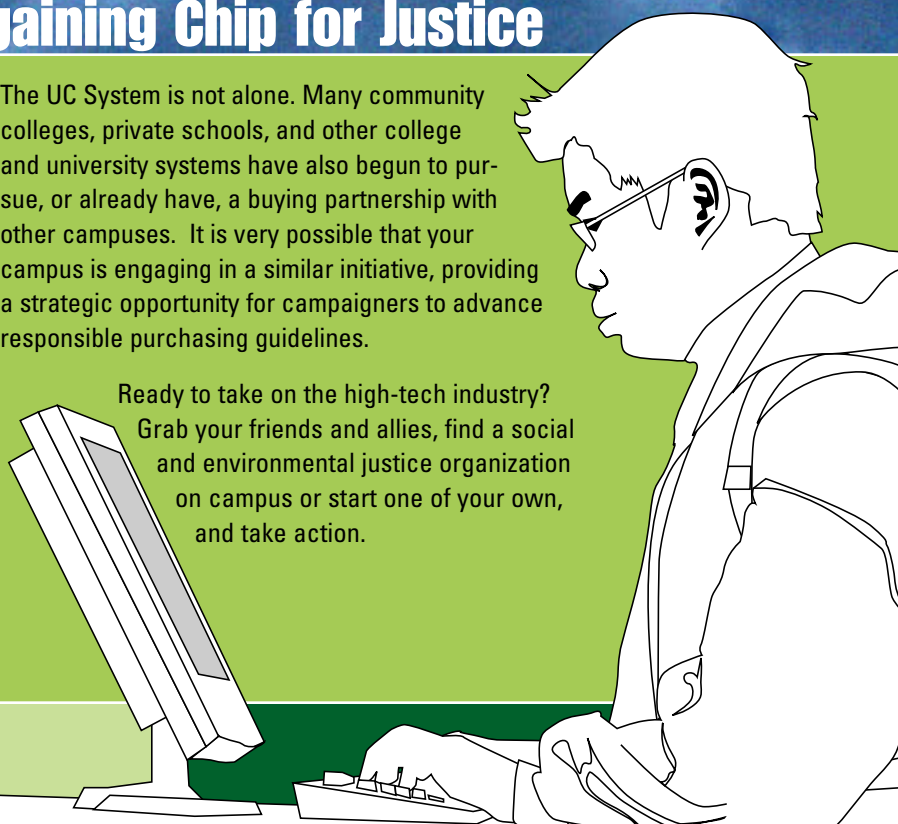
Strategic Sourcing: A Bargaining Chip for Justice

The major college systems in California are beginning to recognize their buying power as a bargaining chip for social and environmental performance. The University of California System is currently undertaking a Strategic Sourcing Initiative that will attempt to combine the buying power of all ten campuses to receive the most competitive prices and performance from their vendors.

The UC system purchases well over $2 billion in goods and services every year and can be an important player in driving social and environmental progress in the high-tech industry.[27] How forward-thinking these policies become depends on how engaged student groups and other progressive forces are in making EPP a mandatory part of the UC Strategic Sourcing Initiative.

The UC System is not alone. Many community colleges, private schools, and other college and university systems have also begun to pursue, or already have, a buying partnership with other campuses. It is very possible that your campus is engaging in a similar initiative, providing a strategic opportunity for campaigners to advance responsible purchasing guidelines.

Ready to take on the high-tech industry? Grab your friends and allies, find a social and environmental justice organization on campus or start one of your own, and take action.



Contact Us Use Silicon Valley Toxics Coalition to get the facts, tools, videos, training, and support you need to develop a campaign. E-mail us at StudentAction@svtc.org, call us at 408.287.6707, and visit us online at www.svtc.org.

Get the Word Out Hold workshops, video showings, and presentations on your campus about the social and environmental impacts of the high-tech industry to recruit new folks. Give out copies of this report.

Connect With Others Use your outreach and organizing skills to find other students and groups who will work with you on this issue. Start a list-serv, forum, blog, or website to stay in touch.

Demand EPP Call on the administration to adopt Environmentally Preferable Purchasing (EPP) guidelines. If they don't, mount a campaign. (Use rallies, protests, sign-on letters, and the media). We will help you build the skills and get the tools you need to win.

Use Student Government Get your student government to pass a resolution to demand EPP for electronics.

Pitch the Press Get a local reporter or your student paper to investigate where your campus e-waste goes. Write an op-ed and letters to the editor.

Volunteer or Intern with Silicon Valley Toxics Coalition, the Computer TakeBack Campaign, or one of our partner organizations to move our human rights and environmental justice campaigns forward.

Take It to Class Agitate for social and environmental justice and sustainability curricula for engineering, chemistry, and other science and technology-related majors.

Demand Reuse and Recycling When upgrading, make sure your campus gives working equipment to non-profits, schools, and communities in need. When equipment is not working, demand the use of responsible recyclers who have signed the Electronic Recyclers Pledge of True Stewardship (see appendix).

Organize a Collection Drive Recover both functional and obsolete personal electronic equipment from students to educate them about e-waste and the high-tech industry and send them for reuse and proper recycling.

10 things you can do

Resources

Organizational Resources

Asian Pacific Environmental Network/ Power in Asian Organizing
310 8th Street, Suite 309
Oakland, CA 94607
www.apen4ej.org

Basel Action Network*
122 S. Jackson, Suite 320
Seattle WA 98104
www.ban.org

Center for Environmental Health*
528 61st Street, Suite A
Oakland, CA
www.cehca.org

Clean Production Action*
P.O. Box 153
Spring Brook, NY 14140
www.cleanproduction.org

Clean Water Action, New England*
262 Washington Street, Room 301
Boston, MA 02108
www.cleanwateraction.org/ma/

Silicon Valley Toxics Coalition*
760 North First Street
San Jose, CA 95112
www.svtc.org

Southwest Organizing Project
211 10th Street, SW
Albuquerque, NM 87102
www.swop.net

Texas Campaign for the Environment*
611 S. Congress #200
Austin, TX 78704
www.texasenvironment.org

* member of the Computer TakeBack Campaign
www.computertakeback.com

International Organizations

Asia Monitor Resource Center, Hong Kong
www.amrc.org.hk

Communities Against Toxics (CATS), UK
http://www.communities-against-toxics.org.uk/

Consumers' Association of Penang (CAP)
228 Macalister Road
10400 Penang, Malaysia
Phone 604-8299511
Fax 604-8298109

Global Alliance for Incinerator Alternatives (GAIA)
www.no-burn.org

Greenpeace International, Toxics Campaign
www.greenpeace.org/international/campaigns/toxics/electronics

Hong Kong Christian Industrial Committee
http://www.cic.org.hk/

Korean Waste Movement Network, Seoul, Korea
http://www.waste21.org.kr/

Labour Resource Centre, Malaysia
www.labourcentre.org/

Recycling Council of Ontario, Ontario, Canada
http://www.rco.on.ca/

Taiwan Watch
http://www.taiwanwatch.org.tw

SOMO(Centre for Research on Multinational Corporations), Netherlands
www.somo.nl

Toxic Links, India
http://www.toxicslink.org/

Workers Health & Safety Centre, Ontario, Canada
http://www.whsc.on.ca/

A Few Resources on Student Activism**

California Student Sustainability Coalition
www.sustainabilitycoalition.org

Campus Activism.org
www.campusactivism.org

Energy Action
www.energyaction.net

Raise Your Voice Campaign (Organizing Resources)
www.actionforchange.org

The Ruckus Society (direct action resources)
www.ruckus.org

The SPIN Project (media advocacy resources)
www.spinproject.org

Student Environmental Action Coalition
www.seac.org

Students United for a Responsible Global Environment (SURGE Network)
www.surgenetwork.org

United Students Against Sweatshops
www.studentsagainstsweatshops.org

** We are providing these organizations as useful resources on student activism. They are not necessarily affiliated with our coalitions or campaigns.

For additional publications, videos, speakers and other resources, please contact Silicon Valley Toxics Coalition at 410.287.6707, e-mail us at StudentAction@svtc.org or visit www.svtc.org.

For copies of the documentary videos and reports: *Exporting Harm: The High-Tech Trashing of Asia* or *Digital Dump: Exporting Re-Use and Abuse to Africa* Please visit The Basel Action Network at www.ban.org

Pledge

The Pledge of True Stewardship is signed and upheld by over 30 electronic recyclers in the United States. To learn more about the pledge and to find a responsible recycler in your community, go to www.svtc.org or www.ban.org.

Electronics Recycler's Pledge of True Stewardship

We, the undersigned recycling company, agree to uphold the following as a pledge of true stewardship of electronic wastes:

1. We will not allow any hazardous e-waste* we handle to be sent to solid waste (non-hazardous waste) landfills or incinerators for disposal or energy recovery, either directly or through intermediaries.

2. Consistent with decisions of the international Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, we will not allow the export of hazardous e-waste we handle to be exported from developed to developing countries** either directly or through intermediaries.

3. We will not allow any e-waste we handle to be sent to prisons for recycling either directly or through intermediaries.

4. We assure that we have a certified, or otherwise comprehensive and comparable "environmental management system" in place and our operation meets best practices.

5. We commit to ensuring that the entire recycling chain, including downstream intermediaries and recovery operations such as smelters, are meeting all applicable environmental and health regulations. Every effort will be made to only make use of those facilities (e.g. smelters), which provide the most efficient and least polluting recovery services available globally.

6. We agree to provide visible tracking of hazardous e-waste throughout the product recycling chain. The tracking information should show the final disposition of all hazardous waste materials. If there is a concern about trade secrets, an independent auditor acceptable to parties concerned can be used to verify compliance with this pledge.

7. We agree to provide adequate assurance (e.g. bonds) to cover environmental and other costs of the closure of our facility, and additionally, to provide liability insurance for accidents and incidents involving wastes under our control and ownership. Additionally we will ensure due diligence throughout the product chain.

8. We agree to support Extended Producer Responsibility (EPR) programs and/or legislation in order to develop viable financing mechanisms for end-of-life that provides that all legitimate electronic recycling companies have a stake in the process.

9. We further agree to support design for environment and toxics use reduction programs and/or legislation for electronic products.

* Following the basic definitions of the Basel Convention, "hazardous electronic waste" will for the purposes of this pledge include circuit boards, CRTs as well as computers, monitors, peripherals, and other electronics containing circuit boards and/or CRTs. It will also include mercury and PCB containing components, lamps and devices. The definition of "hazardous electronic waste" will not include non-hazardous wastes such as copper unless it is contaminated with a Basel hazardous waste such as lead, cadmium, PCBs, mercury etc. The definition of "hazardous electronic waste" includes non-working materials exported for repair unless assurances exist that hazardous components (such as CRTs or circuit boards) will not be disposed of in the importing country as a result. The definition of "hazardous electronic waste" does not include working equipment and parts that are certified as working, that are not intended for disposal or recycling, but for re-use and resale.

** Following the definitions of the Basel Convention and its Basel Ban Amendment, developing countries are any country not belonging to either the European Union, the Organization of Economic Cooperation and Development (OECD) or Liechtenstein. For a complete list of OECD countries see http://www.ban.org/country_status/country_status.html and find countries shaded in gray.

Principles

The following statement represents the expectations the Computer TakeBack Campaign has set for electronics producers. Through our campaign efforts, Dell Computers and HP have endorsed this statement. With a multi-pronged approach that combines influencing large purchasers, such as your college and directly targeting corporations, we can pressure many more high-tech companies to sign on the dotted line.

Statement of Principles on Producer Responsibility for U.S. Electronic Waste

We support the policy of producer responsibility in the U.S. for electronic products at the end of their useful lives, wherein brand-name manufacturers/producers work with consumers and state and local governments to properly collect and manage electronic products in an environmentally responsible fashion. Manufacturers and producers accept responsibility for continually improving the environmental aspects of the design of their products and for the end-of-life management of their products. This policy will have many benefits for consumers, electronics producers, local governments, the public health and the environment.

This statement refers to the responsibility for the environmentally responsible management of the electronic waste from products sold to all customers in the future. As for products sold in the past ("legacy" electronic waste, including "orphan" products for which the relevant producer/brand owner is no longer in business), we advocate that all due measures should be taken to allocate primary responsibility to those who manufactured and sold these products in the first instance. For that orphan waste which cannot be allocated to past producers, we support the principle that current electronics producers as well as those entering the market in the future should share in the responsibility of managing this electronic waste based on an equitable cost allocation related to historic market share. [See point 3 of alternative policy section below]

We support the objective of producer responsibility to create incentives for producers to improve the design of their products to minimize their life-cycle impacts on the environment. In particular, we support activities designed to:

- Phase out the use of potentially hazardous substances consistent with the recent European ROHS directive and other worldwide standards as they become law;
- Improve options to upgrade equipment over the course of the equipment's life; and
- Increase the integration of non-hazardous recovered materials into new products.

We believe that producer responsibility can operate most effectively through the competitive marketplace, but that all stakeholders—consumers, producers, governments, and the general public—play an important role. All stakeholders need assurances that all producers are held to the same high environmental standards. Therefore, we support a public policy framework in the U.S. that provides for individual producer responsibility, through mechanisms that assure proper end of life management of producers' own products sold in the future. It is expected that individual producers may choose to cooperate with others in carrying out this responsibility in order to achieve efficiencies of scale.

continues>

>statement on principles continued

We do not advocate an "advanced recovery fee" approach to financing the management of electronic waste, such as has been adopted through SB20 in California and which is under consideration within the National Electronic Product Stewardship Initiative process. We support an alternative financing model which allows for responsible companies to avoid an Advanced Recovery Fee and provides for cost internalization of end of life management costs by producers for new products entering the marketplace combined with industry sponsored programs designed to offset the incremental costs borne by local governments and others to collect discarded electronic products.

We recognize that in order to be viable and effective, this preferred alternative policy approach includes:

- ambitious, workable and progressive goals and timetables to assure that both legacy and future electronic waste will be properly recovered and managed;
- effective and enforceable environmental standards to assure that hazardous electronic waste will be properly managed in strict compliance with international and domestic laws that govern export of hazardous electronic waste, worker safety, public health and environmental protection, and the use of market labor rather than incarcerated labor;
- a convenient, fair and equitable system of collection that does not create economic disincentives for consumers to participate and is premised upon financial participation by producers so that taxpayers, local governments, or others do not shoulder all the financial burdens of recycling and disposing of electronic products. (Large institutions whose electronic waste is regulated by federal law may be subject to fees to cover the costs of proper recycling and disposal of their historic waste.)
- consumer awareness designed to optimize performance of the system;
- flexibility for producers to design and implement recovery and recycling systems that best suit their particular business model while complying with all applicable laws.

The Computer TakeBack Campaign is national coalition of organizations promoting clean production and producer take back in the computer and electronics industry. The Campaign seeks to protect the public health and the environment from the hazards of high-tech products by requiring brand owners to take financial responsibility for the life-cycle impacts of their products.

www.ComputerTakeBack.com
www.svtc.org

endNOTES

1 Hawkins, Brian Rudy, Julia & Nicolich, Robert *Fiscal Year 2004 Summary Report* Educause Core Data Service, September 2005 pg 35.

2 US Census Bureau, California: 2000, Census 2000 Profile, pg 3 August 2002. http://www.census.gov/prod/2002pubs/c2kprof00-ca.pdf.

3 Hawkins, Brian Rudy, Julia & Nicolich, Robert *Fiscal Year 2004 Summary Report* Educause Core Data Service, September 2005 pg 36.

4 Williams, Eric. Ayers, Robert. And Heller, Miriam *The 1.7 Kilogram Microchip*: Environmental Science and Technology December 15, 2002.

5 US EPA, Region 9, *Mountain View Sites Update*, January 2003, archived at, www.svtc.org/sust_water/moffett/mtviewupdate.pdf.

6 US EPA, *National Priorities List Sites in California*, http://www.epa.gov/superfund/sites/npl/ca.htm.

7 Alexander, Richard *Electronics Industry Fraud: Cancer and Birth Defects A Public Report* Alexander, Hawes & Audet, LLP San Francisco CA http://consumerlawpage.com/article/electric-fraud.shtml.

8 Canadian Business for Social Responsibility *Corporate Social Responsibility Trends in the High Tech Sector* 2005 ed. http://www.cbsr.bc.ca/files/CanHighTech.pdf.

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10 Southwest Network for Environmental Justice and the Campaign for Responsible Technology *Sacred Waters: Life Blood of Mother Earth, Four Case Studies of High-Tech Water Resource Exploitation and Corporate Welfare in the Southwest*, 1997.

11 EPA, Electronics, A New Opportunity for Waste Prevention, Reuse and Recycling, June 2001. http://www.epa.gov/epaoswer/osw/conserve/priorities/green.htm.

12 National Association for Software and Services Company (NASSCOMM) & Indian IT, http://www.nasscom.org/artdisplay.asp?cat_id=809.

13 Basel Action Network website *www.BAN.org*.

14 Federal Bureau of Prisons, http://www.bop.gov/news/quick.jsp#2.

15 Shuman, Aaron, *Prison Guards Poisoned, What about the Inmates?* SF Bay View Newspaper, 9/21/05, http://www.sfbayview.com/092105/poisonedprofits092105.shtml.

16 http://www.unicor.gov/recycling/customerlist.cfm, lasted accessed 12/01/05.

17 Basel Action Network, *Exporting Harm*, February 2002. http://www.ban.org.

18 ibid.

19 Greenpeace, *Recycling of Electronic Waste in India and China*, August 2005. http://www.greenpeace.org/raw/content/international/press/reports/recyclingelectronicwasteindiachinafull.pdf.

20 Qui Bo; Peng Lin; Xu Xijin; Lin Xinsheng; Hong Jidan; Huo Xia, *Medical Investigation of E-Waste Demanufacturing Industry in Guiyu* Town, Medical College, Shantou University, Shantou, Guangdong Province 515031. Presented at the International Conference on Electronic Waste and Extended producer responsibility in China, Beijing, 21-22 April 2004.

21 Basel Action Network *Exporting Harm*, February 2002.

22 NetRegs, *http://www.environment-agency.gov.uk/netregs/legislation/380525/473094/?lang=_e*

23 Hawkins, Brian Rudy, Julia & Nicolich, Robert *Fiscal Year 2004 Summary Report* Educause Core Data Service, September 2005 pg 33.

24 US Census Bureau, California: 2000, Census 2000 Profile, pg 3, August 2002. http://www.census.gov/prod/2002pubs/c2kprof00-ca.pdf.

25 Hawkins, Brian Rudy, Julia & Nicolich, Robert *Fiscal Year 2004 Summary Report* Educause Core Data Service, September 2005 pg 26.

26 Hawkins, Brian Rudy, Julia & Nicolich, Robert *Fiscal Year 2004 Summary Report* Educause Core Data Service, September 2005 pg 24.

27 UC Regents *UC Means Business: Economic Impacts of the UC system* 1999.

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2 Seigel, Lenny *Comparing Apples and Supercomputers: Evaluating Environmental Risk in Silicon Valley* The Rockefeller University.

3 Williams, Eric. Ayers, Robert. And Heller, Miriam *The 1.7 Kilogram Microchip*: Environmental Science and Technology December 15, 2002.

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5 US EPA, *"Computers, E-waste, and Product Stewardship: Is California Ready for the Challenge,"* a report for the US Environmental Protection Agency, Region IX, page 13. May 11th, 2001.

Photos

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Body Burden endnotes

1 http://www.atsdr.cdc.gov/tfacts92.html

2 http://ehp.niehs.nih.gov/docs/1994/102-6-7/focus.html, and http://www.atsdr.cdc.gov/tfacts4.html

3 http://www.intox.org/databank/documents/chemical/mercury/cie322.htm

4 http://www.epa.gov/epaoswer/hazwaste/recycle/ecycling/faq.htm

5 http://www.atsdr.cdc.gov/HEC/CSEM/arsenic/exposure_pathways.html

6 http://www.atsdr.cdc.gov/tfacts19.html

7 http://www.intox.org/databank/documents/chemical/cadmium/ehc135.htm and http://www.eco-usa.net/toxics/cadmium.shtml

8 http://www.hc-sc.gc.ca/english/iyh/environment/lead.html and http://www.intox.org/databank/documents/chemical/lead/ukpid25.htm

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